



DEPARTMENT OF THE NAVY
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From: Commander, Naval Facilities Engineering Command, Criteria Office
To: Distribution

Subj: INTERIM TECHNICAL GUIDANCE (ITG) – MOORING SERVICE TYPE III
(HEAVY WEATHER MOORINGS)

Ref: (a) COMNAVSEASYS COM msg R 130351Z Jul 95 ZYB
(b) "Mooring Design," Military Handbook 1026/4A (1 July 1999)
(c) "Maintenance of Waterfront Facilities," Military Handbook 1104 (draft - 10 Dec 99)
(d) "Inspection of Mooring Hardware," Military Handbook 1104/3 (draft - Sept 99)
(e) "Piers and Wharves," Military Handbook 1025/1 (draft - Jan 00)

Encl: (1) "U.S. Navy Heavy Weather Mooring Safety Requirements," NFESC Report
TR-6012-OCN Rev B of May 2000

1. **Purpose:** The purpose of this guidance is to advise facility engineers, planners, and maintenance personnel of minimum facility planning and design criteria necessary to ensure safe mooring of naval vessels during Mooring Service Type III (Heavy Weather). Use this document to validate existing sites for heavy weather use and to design new or modified facilities and moorings for heavy weather. Existing facilities and moorings should not be used for heavy weather if they do not meet all criteria noted herein unless provisions are made according to reference (a). Retain this guidance until it is incorporated into the criteria noted in paragraph 5. Since no Building Code or non-government standard exists for Mooring Service Type III design, this document, including references (b) – (e) and enclosure (1), provides the relevant safety requirements and criteria for facility aspects of ship mooring.

2. **Background:** It is common practice for U.S. Navy ships to exit port prior to arrival of hurricanes and other forecasted extreme weather conditions. This practice is normally executed when destructive winds (sustained wind speed above 50 knots) are expected in the local area. However, ships in availability (i.e. under repair) may not be able to go to sea. Therefore, these ships must be moored safely during heavy weather or be moved to nearby safe facilities before storm arrival. Reference (a) provides operational recommendations to mitigate many effects of Heavy Weather. The effectiveness of these mitigation measures are difficult to quantify. Therefore, facilities are often relied upon to resist the loads. In each homeporting region, only a portion of all berthing facilities must be capable of heavy weather mooring, since only a portion of the ships cannot go to sea. Ships carry enough lines to moor in Mooring Service Type II as defined below, but not for Type III. Also, facilities are generally designed for Type II and not Type III.

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3. **Discussion:** This criteria is a compilation of lessons learned from Heavy Weather mooring studies for COMNAVSURFLANT by COMNAVFACENGCOM, NFESC, and COMNAVSEASYS COM. It includes state of the art technology in vital facility areas such as mooring and risk assessment. Congressional support for all new construction is dependent on specific planning and design criteria applied consistently throughout the Navy - hence, the need to formalize this criteria. Upgrades to existing facilities likewise require documentation of new "code" requirements.

a. Any given mooring configuration will provide one of four service levels:

- Type I - Mild Weather Mooring used for short term visits such as ports of call, fueling and ammunition loading operations
- Type II - Storm Mooring used for long term visits such as homeports
- Type III - Heavy Weather Mooring used for ships unable to go to sea before hurricane or typhoon such as repair berths and dry docks
- Type IV - Permanent Moorings used for museums and inactive ships

b. See reference (b) for more details regarding Mooring Service Types. This criteria addresses specifically Type III moorings by providing design guidance to manage risk at an acceptable level.

4. **Criteria:**

See Enclosure (1)

5. **Action:**

a. Planning – Engineering Field Divisions, Components, and Activities should assist Claimants, Regional Commanders, and Shipyards to determine the number, location, and critical ship class requirement for moorings used locally during Mooring Service Type III. Mooring Service Type should be identified during the planning phase of waterfront structures. Recommendations are provided in enclosure (1).

b. Analysis and Design – Engineers at Engineering Field Divisions, Components, and Public Works Centers should analyze moorings according to climatological criteria stated in enclosure (1). Commercial enterprises providing mooring for US Navy ships should likewise conform to the criteria contained herein. Lines should provide a factor of safety against breaking of 2.5. Design pier and wharf fittings for a working load equal to the break strength of the largest lines

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expected to use the fitting. Moorings used for Type III service are subjected to significant dynamic wind loads and should be analyzed accordingly. NFESC has capability of providing this type of analysis on a reimbursable basis. Aramid and nylon lines also respond differently to dynamic loads and should be properly modeled in the analysis. Engineers should also verify the capacity of ship fittings for Type III Moorings. Dynamic analysis indicated that in order to moor a CVN in heavy weather a ship alt is required as well as facility upgrades at NNSY and NAVSTA Mayport. Ship alts, if required, should be coordinated with the NAVSEA POC listed below.

c. Maintenance – Maintenance personnel should inspect moorings to ensure acceptable performance during heavy weather. References (b) and (c) provide inspection guidance.

d. Operations – Activities should provide additional mooring lines to supplement ship mooring lines for use during Mooring Service Type III.

e. Criteria – NAVFAC Criteria Office will coordinate revisions of the following criteria to incorporate the interim technical guidance stated herein:

1. References (b), (c), (d) and (e)

5. Coordination: This ITG has been coordinated with COMNAVSEASYS COM and internally within NAVFACENGCOM, COMNAVSURFLANT, CINCLANTFLT N37, N46, and CINCPACFLT N37, N46.

6. Points of Contact:

a. For clarification or additional information related to this subject, please contact the NAVFAC Criteria Office. The NAVFAC Criteria Office Point of Contact is Mr. David Curfman, P.E., Special Assistant for Waterfront and Harbors DSN 262-4203/ 757-322-4203, fax 757-322-4416, curfmanrd@efdlant.navy.mil. All heavy weather studies for COMNAVSURFLANT including references (b), (c), (d) and (e) and enclosure (1) are available at <http://criteria.navy.mil/criteria>.

b. For technical assistance in heavy weather mooring dynamic analysis, please contact the Naval Facilities Engineering Service Center (NFESC) Mooring Center of Expertise. The Point of Contact is Mr. William (Bill) N. Seelig. He can be reached at DSN 288-2396/202-433-2396, fax 202-433-5089, or SeeligWN@nfesc.navy.mil

c. For operational assistance related to the subject, please contact COMNAVSURFLANT, N43. The COMNAVSURFLANT Point of Contact is LCDR Rich Blank. He can be reached at 757-836-3305 or rblank@cnsi.spear.navy.mil

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d. For interface with ship configuration related to the subject, please contact COMNAVSEASYS COM, 05P. The COMNAVSEASYS COM Point of Contact is Mr. Larry Grafton. He can be reached at 703-602-1845 x 181 or GraftonCM@navsea.navy.mil.



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